CLAIMS

1. A method of manufacturing a microcomponent assembly, comprising:
providing first and second microcomponents having respective first and second contact
areas and having feature dimensions less than about 50 microns;

forming a junction compound on at least one of the first and second contact areas; positioning the first and second contact areas adjacent each other on opposing sides of the junction compound; and

activating the junction compound to couple the first and second microcomponents.

- 2. The method recited in Claim 1 wherein the feature dimensions are less than about 25 microns.
 - 3. The method recited in Claim 1 wherein the junction compound comprises indium.
- 4. The method recited in Claim 1 wherein activating the junction compound electrically couples the first and second microcomponents.
- 5. The method recited in Claim 1 wherein the junction compound is formed on both of the first and second contact areas.
- 6. The method recited in Claim 1 wherein the junction compound is formed by sputtering.
- 7. The method recited in Claim 1 wherein the junction compound is formed by a method selected from the group consisting of:

electroplating;
chemical vapor deposition (CVD);
plasma enhanced CVD;
physical vapor deposition;
ionized metal plasma deposition; and
atomic layer deposition.

- 8. The method recited in Claim 1 wherein activating the junction compound comprises heating the junction compound.
- 9. The method recited in Claim 8 wherein the junction compound is heated by heating the first and second microcomponents in a temperature-controlled process chamber.
- 10. The method recited in Clam 8 wherein the junction compound is heated by exposing the junction compound to a laser.
- 11. The method recited in Claim 8 wherein at least one of the first and second microcomponents comprises a heater element proximate the junction compound and the junction compound is heated by operating the heater element.
- 12. The method recited in Claim 8 wherein the junction compound is heated by thermal energy transferred from a gripping mechanism to the junction compound.
- 13. The method recited in Claim 1 wherein at least one of the first and second microcomponents is a nanocomponent.
- 14. The method recited in Claim 1 wherein one of the first and second microcomponents is a substrate.
- 15. A method of manufacturing a microcomponent assembly, comprising: providing a substrate having a first contact area; providing first and second microcomponents each having a second contact area; forming a junction compound on at least one of the first and second contact areas; positioning the first and second contact areas adjacent opposing sides of the junction compound; and

activating the junction compound to couple the first and second microcomponents to the substrate.

- 16. The method recited in Claim 15 wherein the first and second contact areas are positioned before the junction compound is activated.
- 17. The method recited in Claim 15 wherein a first portion of the junction compound adjacent the second contact area of the first microcomponent is activated before the second contact area of the second microcomponent is positioned adjacent a second portion of the junction compound.
 - 18. A microcomponent assembly, comprising:

first and second microcomponents having respective first and second contact areas; and a heat-activated junction compound located between the first and second contact areas, thereby coupling the first and second microcomponents.

- 19. The assembly recited in Claim 18 wherein at least one of the first and second microcomponents is a nanocomponent.
- 20. The assembly recited in Claim 18 wherein the junction compound comprises indium.
 - 21. A microcomponent assembly, comprising:
 - a first microcomponent having a first contact area and a connecting member;
- a second microcomponent having a second contact area and an opening configured to receive the connecting member;

a junction compound located between the first and second contact areas, thereby coupling the first and second microcomponents.

22. The assembly recited in Claim 21 wherein the second microcomponent includes a retaining surface adjacent the opening and the connecting member includes a barbed member configured to engage the retaining surface.

- 23. The assembly recited in Claim 21 wherein the junction compound comprises indium.
 - 24. The assembly recited in Claim 21 wherein the junction compound comprises a heat-activated compound.
 - 25. The assembly recited in Claim 21 wherein the first and second microcomponents comprise electrical conductors and the junction compound electrically couples the electrical conductors.
 - 26. The assembly recited in Claim 21 wherein at least one of the first and second microcomponents includes a heating element proximate the junction compound.
- 27. The assembly recited in Claim 21 wherein at least one of the first and second microcomponents is a nanocomponent.